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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/820,347

04/07/2004

Eric K. Hall

907A.0141.U1(US)

8144

29683 7590 08/20/2008  
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EXAMINER

TIMORY, KABIR A

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

08/20/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/820,347	<b>Applicant(s)</b> HALL ET AL.	
	<b>Examiner</b> KABIR A. TIMORY	<b>Art Unit</b> 2611	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 May 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Request for Continued Examination (RCE) Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/27/2008 has been entered.

### **Response to Arguments**

2. Applicant's arguments with respect to claims 1 and 5 have been considered but are moot in view of new ground(s) of rejection because of the amendment.

3. The objections to the claims 8 and 21 are corrected by the amendment.

Therefore, the objections to the claims are withdrawn.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**5. Claims 1, 2, 4, 6-8, 13-15, 17, 19-21, and 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al (US 2003/0043928) in view of Shor et al. (US 2004/0174809).**

**Regarding claims 1 and 14:**

As shown in figure 1, Ling et al. discloses a method to operate a digital signal receiver, comprising:

- detecting the occurrence of a symbol degrading event for a received signal (error detection is interpreted to be detecting the occurrence of a symbol degrading. Also channel interleaver provides diversity against path effects such as fading) (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4);
- inserting zero symbols into a received symbol stream prior to de-interleaving the received signal (paragraph 0025, lines 9-18, paragraph 0029, lines 13-19); and
- error correction decoding the received symbol stream having the inserted zero symbols (figure 8, paragraph 0144, lines 1-6).

Ling et al. clearly disclose a channel Interleaver 116 and Puncturer 117 and also in paragraph 0025, Ling et al. discloses that this method is used to combat fading. Moreover, the system of figure 1 of Ling et al. illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160 and “erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160

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and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164”.

Although, Ling et al. disclose all of the subject matter as described above except for specifically teaching to replace symbols degraded by the signal degrading event.

However, Shor et al., in the same field of endeavor, teaches to replace symbols degraded by the signal degrading event (par 0038, lines 4-13, par 0039, lines 7-13, par 0040, lines 7-10, and par 0042)

One of ordinary skill in the art would have clearly recognized that in a communication system, in order to combat channel/signal fading and degradation, zero insertion and interleaving methodology are used. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the method and system of zero insertion of Shor et al. to modify the system and method Ling et al. in order to combat fading and/or signal degradation, to improved system performance, selective fading mitigation and increased signal flatness, and to recover faded signal.

**Regarding claims 2 and 15:**

Ling et al. further discloses where error correction decoding comprises operating a Reed-Solomon decoder (the system which has Reed-Solomon coder would also have a Reed-Solomon decoder) (paragraph 0068, lines 3-6).

**Regarding claims 4 and 17:**

Ling et al. further discloses where error correction decoding comprises operating a Turbo decoder (paragraph 0135, lines 4-5).

**Regarding claims 6 19:**

Ling et al. further discloses where inserting occurs after a Viterbi decoder (paragraph 0147, lines 1-3).

**Regarding claims 7 and 20:**

Ling et al. further discloses where error correction decoding comprises first de-interleaving the received symbol stream having the inserted zero symbols (figure 8, 160, paragraph 0029, lines 13-19).

**Regarding claims 8 and 21:**

Ling et al. further discloses where detecting comprises:

- estimating a signal to noise ratio (SNR) of a block of L contiguous received symbols, where L is an integer greater than or equal to one;  
comparing the estimated SNR to a threshold SNR value (paragraph 0010, lines 6-9);  
and
- replacing L symbols with L zero symbols when the estimated SNR is less than the threshold SNR (paragraph 0025, lines 9-16).

**Regarding claims 13 and 26:**

Ling et al. further discloses where detecting uses information received from a transmitter that is indicative of a time when a deep fade occurs (figure 1, paragraph 0084, lines 1-4).

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**6. Claims 3, 5, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Shor et al. as applied to claims 1 and 14 above and further in view of Koetter et al. (Us 6,634,007).**

**Regarding claim 3 and 16:**

Ling et al. and Shor et al. disclose all of the subject matter as described above except for specifically teaching, where error correction decoding comprises operating a BCH decoder.

However, Koetter et al., in the same field of endeavor, teaches where error correction decoding comprises operating a BCH decoder (column 12, lines 27-32).

One of ordinary skill in the art would have clearly recognized that in order to correct multiple random errors, coding methodology such as BCH (Bose-Chaudhuri-Hocquenghem) coding is used. By using this technique, we can estimate the likelihoods of the symbols that were input to the communication channel. In order to estimate the likelihood of the received symbols, it would have been obvious to one ordinary skill in the art at the time the invention was made to use BCH coding methodology as taught by Koetter et al. in the soft decoding of Reed-Solomon codes. Using BCH decoding techniques is advantageous because it will provide a sufficient method of soft-decision decoding and forward error-correction.

**Regarding claim 5 and 18:**

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Ling et al. and Shor et al. disclose all of the subject matter as described above except for specifically teaching, where inserting occurs in conjunction with operating a BPSK bit metric calculator.

However, Koetter et al., in the same field of endeavor, teaches where inserting occurs in conjunction with operating a BPSK bit metric calculator (column 16, lines 66-67).

One of ordinary skill in the art would have clearly recognized that there are several modulation techniques such as Phase Shift Keying (PSK). Also in digital communication we can use BPSK (Binary Phase Shift Keying) modulation to modulate the phase of a reference signal. In BPSK, a finite number of phases are used. Each of these phases is assigned a unique pattern of Binary Bits. Usually, each phase encodes an equal number of bits. Each pattern of bits forms the Symbols that is represented by the particular phase. In order to modulate the received signal in digital format, it would have been obvious to one ordinary skill in the art at the time the invention was made to use BPSK modulation methodology as taught by Koetter et al. in the soft decoding of Reed-Solomon codes. It is advantageous to use BPSK modulation because BPSK is the simplest form of PSK. It uses two phases which are separated by 180 degrees. Also BPSK modulation is the most robust of all the PSKs modulation.



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**7. Claims 9-12 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Shor et al. as applied to claims 1 and 14 above and further in view of Slack et al. (Us 4,574,252).**

**Regarding claim 9 and 22:**

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where detecting comprises examining the output of at least one Automatic Gain Control (AGC) circuit.

However, Slack et al., in the same field of endeavor, teaches, where detecting comprises examining the output of at least one Automatic Gain Control (AGC) circuit (figure 1, abstract, lines 1-6).

One of ordinary skill in the art would have clearly recognized Receivers for mobile communication systems include Automatic Gain Control (AGC) subsystems, which attempt to minimize the fluctuations in the received signal energy and consequently amplitude. In order to accomplish an approximately constant received signal energy, it would have been obvious to one ordinary skill in the art at the time the invention was made to include a AGC circuit in the system as taught by Slack et al. To adjust the signal power level, it is advantageous to use an Automatic Gain Control subsystem to achieve the appropriate power level in the received signal.

**Regarding claim 10 and 23:**

Ling et al. further discloses means for replacing symbols with zero symbols when either the first or the second threshold is exceeded (paragraph 0029, lines 13-19).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where said circuit comprises means for comparing the output of a slow AGC to a first threshold, means for comparing the output of a fast AGC to a second threshold.

However, Slack et al., in the same field of endeavor, teaches, where said circuit comprises means for comparing the output of a slow AGC to a first threshold, means for comparing the output of a fast AGC to a second threshold (figure 1, 20, 26, 34, 36).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. There are two types of degradation and fading: fast fading and slow fading. To control and adjust the signal power or amplitude level during these two fading conditions, it would have been obvious to one ordinary skill in the art at the time the invention was made to include AGC circuits to combat both fading conditions (fast and slow) as taught by Slack et al. To adjust the signal power level, it is advantageous to use an Automatic Gain Control subsystems to achieve the appropriate power level in the received signal in both fast and slow fading conditions.

**Regarding claim 11 and 24:**

Ling et al. further discloses means for replacing symbols with zero symbols when the difference exceeds the threshold (paragraph 0029, lines 13-19).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where said circuit comprises means for comparing a difference between the output of a slow AGC and the output of a fast AGC to a threshold.

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However, Slack et al., in the same field of endeavor, teaches, where said circuit comprises means for comparing a difference between the output of a slow AGC and the output of a fast AGC to a threshold (figure 1, 20, 26, 34, 36, column 3, lines 58-64).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. There are two types of degradation and fading: fast fading and slow fading. To control and adjust the signal power or amplitude level during these two fading conditions, it would have been obvious to one ordinary skill in the art at the time the invention was made to include AGC circuits to combat both fading conditions (fast and slow) as taught by Slack et al. To adjust the signal power level, it is advantageous to use an Automatic Gain Control subsystems to achieve the appropriate power level in the received signal in both fast and slow fading conditions.

**Regarding claim 12 and 25:**

Ling et al. further discloses means for replacing symbols with zero symbols when the difference exceeds the threshold (paragraph 0029, lines 13-19).

Ling et al. disclose all of the subject matter as described above except for specifically teaching, where said circuit comprises means for comparing a difference between the output of a fast AGC and an average of the output of the fast AGC to a threshold.

However, Slack et al., in the same field of endeavor, teaches, where said circuit comprises means for comparing a difference between the output of a fast AGC and an

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average of the output of the fast AGC to a threshold (figure 1, 20, 26, 34, 36, column 3, lines 58-64).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. There are two types of degradation and fading: fast fading and slow fading. To control and adjust the signal power or amplitude level during these two fading conditions, it would have been obvious to one ordinary skill in the art at the time the invention was made to include AGC circuits to combat both fading conditions (fast and slow) as taught by Slack et al. To adjust the signal power level, it is advantageous to use an Automatic Gain Control subsystems to achieve the appropriate power level in the received signal in both fast and slow fading conditions.

**8. Claims 27- 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Shor et al. and further in view of Rogards et al. (Us 4,718,066).**

**Regarding claim 27:**

Ling et al. further disclose

- in response to detecting the occurrence of the fading condition, inserting zero symbols into a received symbol stream at the receiver (error detection is interpreted to be detecting the occurrence of a symbol degrading. Also channel interleaver

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provides diversity against path effects such as fading) (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4);

- de-interleaving (figure 1, 160) the received symbol stream having the inserted zero symbols signal (paragraph 0029, lines 13-19); and
- decoding (figure 1, 162) the received symbol stream having the inserted zero symbols (Erasures have zero value indicatives) (figure 1,159).

Ling et al. clearly disclose a channel Interleaver 116 and Puncturer 117 and also in paragraph 0025, Ling et al. discloses that this method is used to combat fading. Moreover, the system of figure 1 of Ling et al. illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160 and “erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164”.

Although, Ling et al. disclose all of the subject matter as described above except for specifically teaching to replace symbols degraded by the fading condition.

However, Shor et al., in the same field of endeavor, teaches to replace symbols degraded by the fading condition (par 0038, lines 4-13, par 0039, lines 7-13, par 0040, lines 7-10, and par 0042)

One of ordinary skill in the art would have clearly recognized that in a communication system, in order to combat channel/signal fading and degradation, zero insertion and interleaving methodology are used. Therefore, it would have been

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obvious to one ordinary skill in the art at the time the invention was made to use the method and system of zero insertion of Shor et al. to modify the system and method Ling et al. in order to combat fading and/or signal degradation, to improved system performance, selective fading mitigation and increased signal flatness, and to recover faded signal.

Ling et al. and Shor et al. disclose all of the subject matter as described above except for specifically teaching, detecting the occurrence of a fading condition due to obstruction by the propeller blade and caused by the obstructing propeller blade.

However, Rogards et al., in the same field of endeavor, teaches, detecting the occurrence of a fading condition due to obstruction by the propeller blade and caused by the obstructing propeller blade (periodic fading is interpreted to be a fading condition due to obstruction by the propeller blade) (figure 3, column 1, lines 22-34).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. Due to multipath phenomenon, in a communication system such as satellite radio waves experience phase and amplitude shifts. Also, small shifts in the transmission path could change the phase relationship of signals, causing periodic fading and produce bits or burst errors. To combat the signal fading, it would have been obvious to one ordinary skill in the art at the time the invention was made to design the system such that to be suitable for transmission of data frequently effected by periods of fading as taught by Rogards et al. To combat periodic fading, interleaving techniques are used. These techniques enable the reduction or elimination of the correlation

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between the errors, which affect the successive symbols applied to a decoder, particularly by transmitting the different components of a block in an order different from that which the decoder will receive. These interleaving techniques have the disadvantage of increasing further the transmission time.

**Regarding claim 28:**

Ling et al. further disclose, where decoding comprises operating a concatenated forward error correction (FEC) decoder (figure 1, 162, paragraph 0067, lines 3-5).

**Regarding claim 29:**

Ling et al. further disclose, where decoding comprises operating one of a Reed-Solomon decoder, a BCH decoder, or a Turbo decoder (paragraph 0135, lines 4-5).

**Regarding claim 30:**

Ling et al. further disclose

- in response to detecting the occurrence of the fading condition, inserting zero symbols into a received symbol stream at the satellite (paragraph 0029, lines 13-19);
- de-interleaving (figure 1, 160) the received symbol stream having the inserted zero symbols (paragraph 0029, lines 13-19); and
- error correction decoding (figure 1, 162) the received symbol stream having the inserted zero symbols (Erasures have zero value indicatives) (figure 1,159).

Ling et al. clearly disclose a channel Interleaver 116 and Puncturer 117 and also in paragraph 0025, Ling et al. discloses that this method is used to combat fading. Moreover, the system of figure 1 of Ling et al. illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160 and “erasures (e.g., zero value

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indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164”.

Although, Ling et al. disclose all of the subject matter as described above except for specifically teaching to replace symbols degraded by the fading condition.

However, Shor et al., in the same field of endeavor, teaches to replace symbols degraded by the fading condition (par 0038, lines 4-13, par 0039, lines 7-13, par 0040, lines 7-10, and par 0042)

One of ordinary skill in the art would have clearly recognized that in a communication system, in order to combat channel/signal fading and degradation, zero insertion and interleaving methodology are used. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the method and system of zero insertion of Shor et al. to modify the system and method Ling et al. in order to combat fading and/or signal degradation, to improved system performance, selective fading mitigation and increased signal flatness, and to recover faded signal.

Ling et al. and Shor et al. disclose all of the subject matter as described above except for specifically teaching, detecting, on the satellite, the occurrence of a fading condition due to obstruction by the propeller blade and caused by the obstructing propeller blade.



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However, Rogards et al., in the same field of endeavor, teaches, detecting, on the satellite, the occurrence of a fading condition due to obstruction by the propeller blade and caused by the obstructing propeller blade (periodic fading is interpreted to be a fading condition due to obstruction by the propeller blade) (figure 3, column 1, lines 22-34).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. Due to multipath phenomenon, in a communication system such as satellite radio waves experience phase and amplitude shifts. Also, small shifts in the transmission path could change the phase relationship of signals, causing periodic fading and produce bits or burst errors. To combat the signal fading, it would have been obvious to one ordinary skill in the art at the time the invention was made to design the system such that to be suitable for transmission of data frequently effected by periods of fading as taught by Rogards et al. To combat periodic fading, interleaving techniques are used. These techniques enable the reduction or elimination of the correlation between the errors, which affect the successive symbols applied to a decoder, particularly by transmitting the different components of a block in an order different from that which the decoder will receive. These interleaving techniques have the disadvantage of increasing further the transmission time.

**Regarding claim 31:**

Ling et al. further disclose:

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- inserting zero symbols into a received symbol stream (paragraph 0068, lines 1-3 and paragraph 0084, lines 1-4); and
- an error correction decoder (figure 1, 162) for decoding the received symbol stream having the inserted zero symbols (Erasures have zero value indicatives) (figure 1,159).

Ling et al. clearly disclose a channel Interleaver 116 and Puncturer 117 and also in paragraph 0025, Ling et al. discloses that this method is used to combat fading. Moreover, the system of figure 1 of Ling et al. illustrates that the de-puncturer 159 is located prior to the channel deinterleaver 160 and “erasures (e.g., zero value indicatives) are then inserted by a de-puncturer 159 for coded bits punctured at system 110. The de-punctured values are then deinterleaved by a channel deinterleaver 160 and further decoded by a decoder 162 to generate decoded bits, which are then provided to a data sink 164”.

Although, Ling et al. disclose all of the subject matter as described above except for specifically teaching to replace symbols corrupted by the fading condition.

However, Shor et al., in the same field of endeavor, teaches to replace symbols corrupted by the fading condition (par 0038, lines 4-13, par 0039, lines 7-13, par 0040, lines 7-10, and par 0042)

One of ordinary skill in the art would have clearly recognized that in a communication system, in order to combat channel/signal fading and degradation, zero insertion and interleaving methodology are used. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the

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method and system of zero insertion of Shor et al. to modify the system and method Ling et al. in order to combat fading and/or signal degradation, to improved system performance, selective fading mitigation and increased signal flatness, and to recover faded signal.

Ling et al. and Shor et al. disclose all of the subject matter as described above except for specifically teaching, a satellite, comprising a receiver for receiving a signal that passes through a channel that is periodically obstructed, the receiver comprising circuitry for detecting the occurrence of a fading condition due to an obstruction and, in response to detecting the occurrence of the fading condition and caused by the periodic obstruction.

However, Rogards et al., in the same field of endeavor, teaches a satellite, comprising a receiver for receiving a signal that passes through a channel that is periodically obstructed, the receiver comprising circuitry for detecting the occurrence of a fading condition due to an obstruction and, in response to detecting the occurrence of the fading condition and caused by the periodic obstruction (column 1, lines 22-34).

One of ordinary skill in the art would have clearly that the signal propagation between the transmitting device and receiving device experience fading and signal degradation. Due to multipath phenomenon, in a communication system such as satellite radio waves experience phase and amplitude shifts. Also, small shifts in the transmission path could change the phase relationship of signals, causing periodic fading and produce bits or burst errors. To combat the signal fading, it would have been obvious to one ordinary skill in the art at the time the invention was made to design the

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system such that to be suitable for transmission of data frequently effected by periods of fading as taught by Rogards et al. To combat periodic fading, interleaving techniques are used. These techniques enable the reduction or elimination of the correlation between the errors, which affect the successive symbols applied to a decoder, particularly by transmitting the different components of a block in an order different from that which the decoder will receive. These interleaving techniques have the disadvantage of increasing further the transmission time.

### ***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KABIR A. TIMORY whose telephone number is (571)270-1674. The examiner can normally be reached on 6:30 AM - 3:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kabir A Timory/

Examiner, Art Unit 2611

/Shuwang Liu/

Supervisory Patent Examiner, Art Unit 2611